Biomass NOI Heat Rate Irving 072705

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From: JIRVING104@aol.com [mailto:JIRVING104@aol.com]
Sent: Wednesday, July 27, 2005 4:26 PM
To: Bernstein, Howard (ENE)
Subject: Re: RPS Biomass NOI 7/28 Conference AGENDA and Pre-Reserved Speakers List

Hi Howard,

Our most recent heat rate test was done in July 1996. The results were a full load (50.1 mw)heat rate of 14,427 btu/net kwh, a mid load (29.2 mw net) heat rate of 16,158 btu/net kwh, and a minimum load (16.5mw net) of 19,460 btu/kwh net. The average fuel moisture content was 49.1 % moisture for the full load test, 40.7% for the mid load test, and 40.7% for the minimum load test. Moisture samples varied from a high of 60.4% to a low of 38.1. The disparity of heat rates above is not due to the moisture content but the turbine cycle is much less efficient at low loads.

There is no standard for moisture content. Wood fuel moisture content varies widely depending on the source of the fuel. Pallets (waste wood) can be as low as 5-10% moisture, fresh whole tree chips are in the 40-50% range, and wood that has been sitting in a pile particularly if it has a high bark content can be 60%+.

May plants are resorting to C&D wood fuel because it is much less expensive and it has a
lower moisture content. The highest moisture content is typically in the spring of the year when the sap is running.

For comparison purposes, take a look at McNeil's full load test. With 50% moisture wood, the boiler efficiency is about 70%. With 55% moisture fuel, the boiler efficiency is 66%. That would result in a 15,300 btu/kwh heat rate instead of the 14,427 in the test. The boiler efficiency with 40% moisture fuel is 74%. This would result in a heat rate of 13,647 instead of the 14,427 tested. Realistically, most plants never test their moisture content. We only test fuel moisture content once a day unless we're doing a heat rate test and then it's hourly which is probably meaningless.

I have some graphs that show wood boiler efficiency as a function of moisture content and other factors. They were made the year I was born, but the laws of physics don't change. I'd be glad to send you a copy if that would be helpful.

Good luck tomorrow, sorry I'll miss it.

John Irving